

SPACE AND GROUND SEGMENTS PERFORMANCE OF THE FORMOSAT-3/COSMIC MISSION: FOUR YEARS IN ORBIT

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The FORMOSAT-3/COSMIC (Constellation Observing System for Meteorology, Ionosphere, and Climate) mission consisting of six low-Earth-orbit satellites is the worlds first demonstration constellation using Global Positioning System radio occultation in near real-time for global weather monitoring, numerical weather prediction, and research. The mission has processed on average 1,400 to 1,800 high-quality atmospheric sounding profiles per day. The atmospheric radio occultation soundings data are assimilated into operational numerical weather prediction models for global weather prediction, including typhoon/hurricane/cyclone forecasts. The radio occultation data has shown a positive impact on weather predictions at many national weather forecast centers. A proposed follow-on constellation mission is to transfer from current experimental research objective to a significantly improved real-time operational objective, which will reliably provide no less than 8,000 soundings per day. The follow-on constellation mission as planned will consist of 12 satellites with data latency at 45 minutes (as threshold); which will provide greatly enhanced opportunities for operational forecasts and scientific research. This paper will address the constellation mission overview, the spacecraft system performance after four year in orbit, the ground system performance, the lessons we have learned from encountered technical challenges, the design improvement for the new spacecraft constellation system design with the enhanced next-generation radio occultation receiver onboard, and the improvements for the follow-on ground system design.